<u>REMARKS</u>

Reconsideration and allowance of this application are respectfully requested in light of the above amendments and the following remarks.

Claim 25 has been amended, claims 26 and 27 have been canceled, and claims 28 and 29 have been newly added.

Claims 25 and 26 were rejected, under 35 USC §103(a), as being unpatentable over Applicants' Description of the Related Art in view of Uesugi (EP 1 011 245). Claims 21, 22, and 25-27 were rejected, under 35 USC §103(a), as be unpatentable over the Applicants' Description of the Related Art in view of Yoshida (EP 0 944 200). Claims 14 and 15 were rejected, under 35 USC §103(a), as being unpatentable over the Applicants' Description of the Related Art in view of Yoshida and Sugiyama et al. (US 5,862,175). Claims 16-20 were rejected, under 35 USC §103(a), as being unpatentable over the Applicants' Description of the Related Art in view of Yoshida and Lee et al. (US 6,259,744). To the extent the rejections may be deemed applicable to the amended claims, the Applicants respectfully traverse based on the points set forth below.

The Applicants respectfully submit that the applied references fail to suggest the combined features recited in claim 25 of: (1) a plurality of demodulators that demodulate a received

7

signal based on regions of demodulation patterns to which signal points belong, using demodulation patterns that differ for error detecting units of the received signal and (2) a plurality of detectors that perform error detection on the demodulated signal for each of the error detecting units to obtain reception data.

In an exemplary non-limiting embodiment of the invention illustrated in Figs. 3 and 4A-4F, six different demodulation patterns are applied to a received signal to determine the regions of these patterns that overlap a received symbol. Accordingly, the receiver illustrated in Fig. 2 employs each of six demodulators 113 to apply a different one of the six demodulation patterns illustrated by Figs. 4A-4F, respectively.

If the transmitted symbol is a 64-QAM symbol, then the six demodulators can determine which one of the 64 prospective symbols of the constellation (indicated by black dots in Figs. 3 and 4A-4F) the received symbol is intended to represent. This determination can be made by comparing the six patterns to the received symbol and eliminating, as candidates for the received symbol, all prospective symbols of the constellation within the regions of negative results (i.e., either shaded regions or slanted line regions).

For example, the constellation position of a received symbol may be visually determined with certainty by sequentially

8

comparing the template patterns illustrated in Figs. 4A-4F with

the received symbol and progressively eliminating, as candidates

for the position of the received symbol, all prospective symbols

of the constellation lying in regions of a particular type (i.e.,

either shaded or slanted line region) for the particular

template.

More specifically, in a case where the symbol representing

the bit pattern 100000 (i.e., the upper right-most symbol

position) in Fig. 3 is transmitted and then received by a

communicating party and if the received symbol is compared to the

six templates illustrated by Figs. 4A-4F, then the position of

the received symbol can be determined with certainty in the

following way. Based on the comparison of the received symbol

with the pattern of Fig. 4A, all candidate positions for the

received symbol within the shaded region (i.e., left side of the

vertical axis) are eliminated. Based on the comparisons of the

received symbol with the patterns of Figs. 4B-4F, all candidate

positions for the received symbol within the slanted-line regions

of each pattern are eliminated. According to this process, all

candidate positions for the received symbol other than the upper

right-most position are eliminated. Therefore, the upper right-

most position represents the received symbol.

Now in a case where the bit pattern 1000 is transmitted using 16-QAM modulation, the same demodulators and demodulation patterns discussed above for receiving a 64-QAM modulated signal may similarly be used to identify, with certainty, the particular 16-QAM symbol that was transmitted. By eliminating all prospective 64-QAM symbol candidates in the shaded region of Fig. 6A and all such candidates in the slanted line regions of Figs. 6B-6D, the receiver may determine that the position of the received symbol lies in the upper right one-fourth of the upper-right quadrant. Because the receiver does not realize that the transmitted symbol is actually a 16-QAM symbol, it can only resolve what it believes to be four of the six bits comprising a 64-QAM symbol. Thus, the receiver believes it has received four bits correctly and two bits in error. In actuality though, all four bits comprising the transmitted 16-QAM symbol have been correctly received by the receiver.

Continuing this example, if the transmitter transmits a symbol representing the bit sequence 10 using QPSK, then the receiver will determine that it has received two bits of a 64-QAM symbol correctly and four bits in error (see Figs. 7 and 8A-8F). However, the receiver will actually have received both bits of the QPSK symbol correctly.

10

The Applicants' Description of the Related Art illustrated in Fig. 1 is incapable of achieving the feature described above, using demodulators 14-1 and 14-2. The Applicants' Description of the Related Art discloses that <u>demodulator 14-2 demodulates a portion of a received multiplexed signal</u> to obtain information identifying the particular type of variable modulation used to modulate payload data (ADRA page 3, lines 20-23). Thereafter, demodulator 14-2 conveys the identified form of variable modulation to demodulator 14-1 so that <u>demodulator 14-1 may demodulate another portion of the received multiplexed signal</u> using the identified form of modulation (page 3, line 23, through page 4, line 1). Thus, the Applicants' Description of the Related Art does not disclose a demodulator that demodulates error detecting units in <u>a transmission unit</u> using different demodulation patterns, as proposed in the Final Rejection (see Final Rejection page 3, lines 5 and 6, and page 4, lines 18 and 19).

As a result, the Applicants' Description of the Related Art does not suggest the claimed feature of a plurality of demodulators that demodulate a received signal based on regions of demodulation patterns to which signal points belong, using demodulation patterns that differ for error detecting units of the received signal. <u>More specifically, the Applicants'</u>

11

Description of the Related Art demodulators 14-1 and 14-2 do not operate on the same symbol and, therefore, cannot both operate on error detecting units of this symbol. Instead, demodulators 14-1 and 14-2 operate on different signals that are multiplexed together by multiplexer 7. Since the Applicants' Description of the Related Art does not suggest multiple demodulators that all operate on error detecting units of a symbol, it necessarily follows that the Applicants' Description of the Related Art cannot teach using demodulation patterns that differ for the error detecting units of the received symbol.

Uesugi similarly discloses applying different types of demodulators to different symbols (see Uesugi ¶¶ 0030-0035). More specifically, Uesugi discloses that a QPSK demodulator demodulates a received QPSK symbol and a BPSK demodulator demodulates a received BPSK symbol. The QPSK and BPSK demodulators do not demodulate the same received symbol.

Although Yoshida may disclose demodulating a received symbol using a plurality of different demodulating schemes, Yoshida does not disclose the claimed feature of performing error detection on each prospective demodulation bit of a highest potential M-ary modulation pattern. In the exemplary application of the invention discussed above in which the highest M-ary form of potential modulation is 64-QAM, the demodulated symbol is always

12

assumed to have six bits, regardless of the actual modulation type applied to the symbol and the number of bits actually associated with this symbol, and error detection is performed on the six generated demodulation bits. By contrast to this feature, Yoshida discloses predicting the type of modulation applied to a symbol and outputting a number of demodulated bits in accordance with the predicted modulation type. Thus, if the predicted modulation type is 64-QAM, then six demodulated bits are output for each received symbol. On the other hand, if the predicted modulation type is BPSK, then one demodulated bit is output for each symbol.

The Final Rejection proposes that the Applicants' Description of the Related Art's error detecting section 16 would detect errors in the demodulated bits (see Final Rejection page 3, lines 9 and 10, and page 4, line 22, through page 5, line 1). However, the Applicants' Description of the Related Art does not suggest performing error detection on a presumed six bits of a demodulated symbol when demodulation section 14-2 identifies the symbol modulation type as BPSK or QPSK. Instead, the Applicants' Description of the Related Art's error detecting section 16 performs error detection on two bits of a demodulated symbol if the modulation type is identified by demodulation section 14-2 as QPSK and on one bit if the identified modulation type is BPSK.

13

The same result would occur if Uesugi's demodulation system were integrated into the system of the Applicants' Description of the Related Art.

The claimed device performs error detection on a number of demodulation bits, representing a received symbol, determined by the highest potential M-ary form of modulation. Thus, in the exemplary embodiment of the claimed invention discussed above in which the highest M-ary type of modulation is 64-QAM, error detection is performed on six demodulated bits representing a received symbol even if the received symbol was modulated using QPSK or BPSK. The applied references do not suggest this feature.
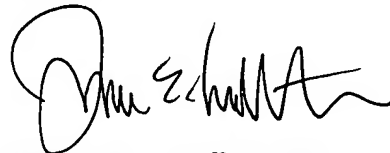
In accordance with the above discussion, the Applicants submit that the applied references, considered alone or together, do not teach or suggest the subject matter defined by claim 25. More specifically, the applied references do not suggest the combined features recited in claim 25 of: (1) a plurality of demodulators that demodulate a received signal based on regions of demodulation patterns to which signal points belong, using demodulation patterns that differ for error detecting units of the received signal and (2) a plurality of detectors that perform error detection on the demodulated signal for each of the error detecting units to obtain reception data. Claim 28 defines a

transmitting apparatus having a modulator that corresponds to the demodulator recited in claim 25 and modulates information in an inverse relationship to the demodulation functionality recited in claim 25. Therefore, allowance of claims 25 and 28 and all claims dependent therefrom is warranted.

In view of the above, it is submitted that this application is in condition for allowance and a notice to that effect is respectfully solicited.

If any issues remain which may best be resolved through a telephone communication, the Examiner is requested to telephone the undersigned at the local Washington, D.C. telephone number listed below.

Respectfully submitted,

James E. Ledbetter
Registration No. 28,732

Date: September 5, 2006
JEL/DWW/att

Attorney Docket No. L9289.02118
STEVENS DAVIS, MILLER & MOSHER, L.L.P.
1615 L Street, N.W., Suite 850
P.O. Box 34387
Washington, D.C. 20043-4387
Telephone: (202) 785-0100
Facsimile: (202) 408-5200